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Original Article

Influence of leaf litters of selected nitrogen fixing *Albizia* trees on the growth of African star apple (*Chrysophyllum albidum* G. Don) seedlings

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ABSTRACT

The shortage of prepared facts on the growth response of *Chrysophyllum albidum* to plant located basic fertilizer has restricted its propagation. In an attempt to advance the slow progress of *C. albidum* seedlings, trial was conducted to evaluate the effect of leaf litters of some nitrogen fixing *Albizia* trees on its growth. The experiment selected a completely randomized design with six treatments copied 5 times. A total of 30 seedlings were included in the experiment. One-year-old *C. albidum* seedlings were attentively transplanted into polythene pots with and without 300 g of leaf litters of nitrogen repairing *Albizia* trees and exposed to one-way analysis of variance. The treatments included leaf litters of adopted nitrogen fixing *Albizia* trees (*Albizia zygia, Albizia coriaria, Albizia ferruginea, Albizia lebbeck*, and *Albizia saman*) and check on the growth of *C. albidum*. The leaf litters of adopted nitrogen fixing *Albizia* trees considerably ($P < 0.05$) improved the growth of *C. albidum*. Significant height (32.88 cm), girth (1.75 cm), number of leaves (12.80), leaf area (84.45 m^2), total fresh weight (21.59 g), and total dry weight (9.00 g) were reported from seedlings transplanted into the soil advanced with leaf litters of *A. coriaria*., while least growth criterion was written from untreated. Planting of *C. albidum* seedlings in the soil enhanced with leaf litters of *A. coriaria* embellishes its growth.

Keywords: Growth response, Indigenous tree species, Nitrogen repairing trees, Plant based manure, Slow growth

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INTRODUCTION

The forest resources responsible for 80% means of living for poor people in the country[1,2] stated the tropical forests contribute to biodiversity conservation, carbon storage, and climate regulation. In spite of that, about 1.1 million km^2 of tropical forest has been lost between year 2000 and 2012. Hansen *et al*.,[3] and FAO[4] established that the natural forest area has diminished by a net 6.5 million ha per year from 2010 to 2015. On-going tropical deforestation endangers world biodiversity and ecosystem services considerably[2] and global climate change is largely modified species distribution, composition, and forest structure.[5] The forest alteration through deforestation has considerably damaged the spread of the species as African star apple or White star apple, *Chrysophyllum albidum* that is important for continuity of present generation. Charity *et al*.[6] established that rapid increase in population growth, urbanization and agricultural activities in most tropical countries has led to the vanishing of most tree species, including *C. albidum*. *C. albidum* is a native economic tree species which is synonymous to Gambeya albida.[7-10] *C. albidum* is a climax tree variety of tropical rainforest that belongs to the classification *Sapotaceae*[11,12] which has up to 800 species and comprise nearly half of the order.[13]

The Yoruba name is "Osan Agbalumo" while in Igbo and Hausa sounds, it is named "Udara" or "Udala" and Agwaluma or Agwaluba sequencially.[12,14,15] The world agroforestry centre (ICRAF) has mentioned *C. albidum* as one of the greatest five priority tree species for domestication in the African humid tropics. Tchounjeu *et al*.[16] and ICRAF[17] reported that these fleshy and juicy fruits, which commonly bitten, are potential beginning of a carbonated beverage or soft drink. The various parts of the trees are alternative source of cure for situation of fibroids and female infertility.[18] Intake of *C. albidum* fruit helps in people's losing weight and treatment of mouth gum

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disease, toothache and sore throat. Adaobi[19] and Agustin[20] established that the post birth diagnosed for diabetic disease for pregnant women can be arrested by eating *C. albidum* fruits because it contains compounds that are hypo glycemic that serves to lower blood sugar levels.

In spite of tremendous potentials of *C. albidum*, it has been greatly, considerably ignored particularly with respect to its regeneration[21-24] noticed that the propagation of fruits trees is abandoned, on account of incompetent news on their growth and lack of attempt to domesticate them, that as a consequence, influenced to their being imperiled endangered. Domestication and cultivation of *C. albidum* demand information on its seed biology and forest management of the seedling of the tree. *C. albidum* is a slow growing tree that that needs expected fertilized for fast growth to meet population demand of its enormous benefits.[25]

Fertilizer will supply elements which are essential for plant growth that absent or insufficient in the soil. Munroe and Isaac[26] established that many tropical areas lack soil nitrogen (N), an essential nutrient for plant growth and the production of food. Insufficient supply or loss of these elements in the soil leads to soil degeneration. Soil degradation in sub-Saharan Africa causes low productivity which consequently amount to hunger and poverty. Sanchez,[27] Sanchez and Swaminathan,[28] Cissé *et al*.[29] specifically reported that the loss of soil carbon (C), nitrogen (N) and phosphorus (P) threaten soil productivity, and leads to untenable land use in the long-term. Trees help to sustain land use in the tropics. Trees within agricultural landscapes, or agroforestry systems, have been established to reduce erosion, increase biodiversity, and restore and sustain soil fertility.[30-34]

Many studies have emphasized the duty of local plants as cheap fertilizers and suggested choice to synthetic fertilizers. Palm *et al*.,[35] Leblanc *et al*.,[36] Kaizzi *et al*.,[37] Abebe *et al*.,[38] Chen[39] established that monetary N inorganic fertilizers are high-priced, with small quantity of its nutrient reaching the plant, which eventually hinders nutrient availability and causes water adulteration. Chemical fertilizers contain high nutrients which are readily available to be taken up by plants. However, excessive use of synthetic fertilizers causes challenges as nutrient loss, surface water and groundwater adulteration, soil acidification or basification, reductions in valuable microbial communities, and increased sensitivity to harmful insects.[39]

Dinitrogen (N_2)-fixing trees are a hopeful substitute to reliably fertilize crops through nitrogen fixation and promise environmental preservation. Munroe and Isaac[26] established that great N_2-fixation rates, upward of 92%, have been studied in some N_2-fixing trees, using the 15N natural abundance method. Dinitrogen-fixing trees can replace nitrogen (N) lost in harvest, own the singular strength to authenticate in N-imperfect soils, and support as of still not completely earned benefits to environment duties.[26,33,40-42] Some nitrogen fixing trees are legumes. Chazdon[43] established that nitrogen fixing legumes are swiftly-growing tree species, which can increase organic matter in the soil, prevent erosion, and embellish nutrient cycling. The most well-known N_2-fixing trees used in tropical agroforestry systems comprise the legumes *Acacia* spp., *Erythrina* spp., *Gliricidia* spp., *Inga* spp., and *Leucaena* spp., which form cooperative friendships with a broad variety of N_2-fixing bacterial species Bala *et al*.,[44] Sileshi *et al*.[45] established that agroforestry practices as alley cropping, improved fallows, cereal-tree legume inter cropping, relay cropping, biomass transfer, fodder banks, multistrata agroforestry, parklands, and silvopastoral systems take advantage of biological nitrogen fixation from fertilizer trees for the supply of N and organic matter to annual and perennial crops. Nitrogen fixing trees are fertilizer trees. Among the established fertilizer trees are *Acacia* (*Acacia* spp.), *Albizia* (*Albizia* spp.), *Alder* (*Alnus* spp.), *Calliandra* (*C. calothyrsus*), *Casuarina* (*C. equisetifolia*), *Erythrina* (*Erythrina* spp.), *Faidherbia* (*F. albida*), *Flemingia* (*Flemingia* spp.), *Gliricidia* (*G. sepium*), *Inga* (*I. edulis*), *Leucaena* (*Leucaena* spp.), *Sesbania* (*Sesbania* spp.), Tagasaste (*Chamaecytisus palmensis*) and *Tephrosia* (*Tephrosia* spp.). Winrock International,[46] WAC[47] further presented inclusive lists of nitrogen-fixing trees where most of *Albizia*s were noticed. Some *Albizia*s are nitrogen-fixers and soil-enhancers. Nygren *et al*.[42] reported that the potential for N_2-fixing trees to embellish fertility within perennial-crop agroforestry systems is clear. Litter improves soil status through adding the organic matter and nutrients to the soil. Ngoran *et al*.,[48] Mahmood and Hoque,[49] Triadiati *et al*.,[50] Hossain *et al*.,[51] Park and Kang-Hyun[52] reported that the leaf litter is the main and fastest source of organic matter and nutrient to the soil relative to other litter types. The added nutrients by leaf litters of trees maintain soil fertility which is important in agroforestry practices. Hasanuzzaman and Mahmood,[53] Gaisie *et al*.[54] established that use of leaf biomass is productive wealth of reconstructing soil productivity based on reports from investigations from tropics. In spite of this, the amount of nutrient addition to a particular ecosystem was reported to change with the species[55,56] and other climatic conditions[53,55,57,58] noticed that the appropriate tree species selection established on nutrient cycling is an important issue in agroforestry practice. Studies on appropriate tree species selection in agroforestry are paramount. The previous studies on *C. albidum* have been focused on the nutrient values,[59] socioeconomic importance,[60] isolation of normal and abnormal seedlings,[13] very restricted facts is feasible on the influence of leaf litters of nitrogen fixing *Albizia* on the growth of *C. albidum* seedlings. Researches have been investigated on the effect of leaf litters of selected nitrogen fixing *Acacia*s (on crops and trees),[61,62] *Albizia*s (on crops),[63] but remain undiscovered for *Albizia*s (on trees as *C. albidum*). In this light, investigation was administered into influence of leaf litters of nitrogen fixing *Albizia* trees on the growth of *C. albidum* seedlings with a view to enhance its growth.

MATERIALS AND METHODS

The research was investigated in the screen house of Federal College of Forestry Mechanization, Afaka, Kaduna State during wet season of 2015. The college is found in the Northern Guinea Savannah ecological zones of Nigeria. It is situated in Igabi Local Government Area of Kaduna State, Nigeria. It lies between Latitude 10°35' and 10°34' and Longitude 7°21' and 7°20.' [Figure 1][64] The mean annual rainfall is approximately 1000 mm. The vegetation is open woodland with tall broad leave trees.[65]

Experimental Procedure

The fruits were garnered from Osiele village in Odeda Local Government, Ogun State and transported to Kaduna State. The seeds were taken out from fruits and air dried for 30 min. Three hundred seeds were extracted from fruits. The viability of the randomly selected seed samples were determined using cutting method.[66] The sowing media (river sand), which was collected from the floor of college dam was made to pass through 2 mm sieve and then sanitized at 160°C for 24 h. The polythene pots used was 20 × 10 × 10 cm^3 in dimension and filled with the sterilized river sand and arranged in the screen house. After a year of germination of seeds, uniform seedlings were available for growth experiment.

The experimental design selected for investigation on the effect of leaf litters of selected nitrogen fixing *Albizia* trees (*Albizia zygia*, *Albizia coriaria*, *Albizia ferruginea*, *Albizia lebbeck*, and *Albizia saman*) on the growth of *C. albidum* was a completely randomized design accompanying five replicates. The choice of picked *Albizia*s was established on the former reports[63] who established that leaf litters of nitrogen fixing *Albizia* trees considerably improved the growth and yield of *Zingiber officinale* and the same picked *Albizia*s was examined for *C. albidum*. One-year-old seedlings were painstakingly transplanted into a potting mixture packed in larger poly pots of 25 × 20 × 15 cm^3 dimensions. The potting mixture contained samples of disinfected sand thoroughly mixed with each leaves of nitrogen fixing *Albizia* trees at same quantity of 300 g.

Each sample of grinded leaves of nitrogen fixing trees was examined chemically for nitrogen, phosphorus and potassium (NPK). The sand without the addition of leaf litters was inspected for nutrient content under untreated soil (control). The 200 mL of purified water per seedling was used to water the seedlings twice daily. Growth criterions were observed every month for 6 months. Growth specifications evaluated include seedling height (utilizing meter rule); girth (utilizing vernier caliper); the number of leaves that were computed manually and leaf area was acquired by linear measurement of leaf length and leaf width as depicted by.[67]

$$LA = 0.74 \times L \times W \quad (1)$$

Where, LA = Leaf area = Product of linear dimension of the length and width at the broadest part of the leaf.

The fresh and dry weight were fixed by the use of Mettler Top Loading Weighing Balance, but dry weight was gotten after oven dried the seedlings at 70°C for 72 h.[68]

Chemical Analysis of Leaf litters Applied

The samples of leaf litters air drained for 2 weeks were evaluated chemically for nitrogen, phosphorus, and potassium (NPK) content at Federal University of Agriculture Abeokuta, Ogun State, Nigeria laboratory. Determination of total nitrogen was accomplished by Macro Kjeldahl method. Available phosphorus (P) was gleaned by Bray-1 method and fixed calorimetrically. Extracts from the digestion of leaf litters were used to decide potassium by flame photometry.

Data Analysis

The data on the effect of leaf litters of adopted nitrogen fixing *Albizia* trees on the growth of *C. albidum* seedlings were submitted to one-way analysis of variance utilizing.[69] Comparison of significant means was accomplished utilizing Fisher's least significant difference at 5% level of significance.

RESULTS

A significant height of 32.88 cm was recorded from seedlings cultivated in the soil enhanced with leaf litters of *A. coriaria* at 24 weeks after transplanting (WAT). The least value of 15.05 cm was recorded from seedlings not influenced with leaf litters of nitrogen fixing *Albizia* trees (control) at 4 WAT [Table 1].

Table 1: Influence of leaf litters of selected nitrogen fixing *Albizia* trees on the height (cm) of *Chrysophyllum albidum* seedlings

NFAT	WAT					
	4	8	12	16	20	24
Albizia lebbeck	19.12^a	20.00^a	21.54^b	21.60^b	23.08^b	32.38^a
Albizia zygia	19.68^a	20.54^a	25.74^a	27.13^a	28.05^{ab}	29.48^{ab}
Albizia coriaria	18.50^{ab}	20.16^a	24.18^{ab}	27.12^a	31.36^a	32.88^a
Albizia ferruginea	15.70^b	17.90^{ab}	18.76^b	22.10^b	28.10^{ab}	32.78^a
Albizia saman	18.46^{ab}	20.02^a	21.20^b	22.20^b	24.76^b	27.00^b
Control	15.05^b	15.10^b	15.31^c	16.71^c	17.78^c	18.95^c
SE±	1.38	1.26	1.32	1.42	1.40	1.45

*Means on the same column having different superscripts are significantly different ($P<0.05$). NFAT: Nitrogen fixing *Albizia* Trees, WAT: Weeks after transplanting

A significant girth of 1.75 cm was recorded from seedlings influenced with leaf litters of *A. coriaria* at 24 WAT. The least value of 0.96 cm was written from seedlings not amended with leaf litters of nitrogen fixing *Albizia* trees (control) at 4WAT [Table 2].

A significant number of leaves of 12.80 were recorded from seedlings planted in the soil amended with leaf litters of *A. coriaria* at 24 WAT. The least value of 6 was recorded for number of leaves of seedlings planted in the soil without the influence of leaf litters of nitrogen fixing *Albizia* trees (control) at 4–8 WAT [Table 3].

A significant leaf area of 85.45 cm^2 was recorded from seedlings cultivated in the soil improved with leaf litters of *A. coriaria* at 24 WAT; while the least value of 10.09 cm^2 was recorded from seedlings planted in unamended soil (control) at 4WAT [Table 4].

Table 2: Influence of leaf litters of selected nitrogen fixing *Albizia* trees on the girth (cm) of *Chrysophyllum albidum* seedlings

NFAT	WAT					
	4	8	12	16	20	24
Albizia lebbeck	1.06^{a}	1.12^{a}	1.16^{ab}	1.30^{a}	1.34^{b}	1.60^{b}
Albizia zygia	1.00^{a}	1.00^{a}	1.10^{b}	1.10^{a}	1.66^{a}	1.72^{ab}
Albizia coriaria	1.00^{a}	1.12^{a}	1.21^{a}	1.26^{a}	1.58^{ab}	1.75^{a}
Albizia ferruginea	1.00^{a}	1.08^{a}	1.08^{b}	1.12^{a}	1.52^{ab}	1.58^{bc}
Albizia saman	1.04^{a}	1.04^{a}	1.14^{ab}	1.20^{a}	1.46^{b}	1.48^{c}
Control	0.96^{a}	1.06^{a}	1.08^{b}	1.08^{a}	1.10^{c}	1.15^{d}
SE±	0.13	0.11	0.04	0.70	0.07	0.05

*Means on the same column having different superscripts are significantly different (P<0.05) NFAT: Nitrogen fixing *Albizia* trees, WAT: Weeks after transplanting

Table 3: Influence of leaf litters of selected nitrogen fixing *Albizia* trees on the number of leaves of *Chrysophyllum albidum* seedlings

NFAT	WAT					
	4	8	12	16	20	24
Albizia lebbeck	6.20^{b}	6.20^{b}	7.60^{b}	8.15^{b}	9.20^{b}	10.25^{b}
Albizia zygia	7.80^{a}	8.00^{a}	8.60^{b}	9.20^{b}	11.60^{a}	12.40^{a}
Albizia coriaria	6.20^{b}	7.40^{ab}	9.00^{ab}	10.00^{ab}	11.00^{a}	12.80^{a}
Albizia ferruginea	7.60^{ab}	8.20^{a}	9.80^{ab}	11.00^{a}	11.20^{a}	12.00^{a}
Albizia saman	6.20^{b}	8.00^{a}	10.40^{a}	10.80^{ab}	11.60^{a}	12.00^{a}
Control	6.00^{b}	6.00^{b}	7.40^{b}	7.80^{b}	8.00^{b}	8.60^{b}
SE±	0.62	0.58	0.62	0.66	0.72	0.71

*Means on the same column having different superscripts are significantly different (P<0.05). NFAT: Nitrogen fixing *Albizia* trees, WAT: Weeks after transplanting

A significant total fresh weight of 21.59 g was recorded from seedlings cultivated in the soil influenced with leaf litters of *A. coriaria*. The least value of 6.19 g was recorded from seedlings planted in the soil without amendment of leaf litters of nitrogen fixing *Albizia* (control). A significant total dry weight of 9.00 g was written from seedlings planted in the soil enhanced with leaf litters of *A. coriaria*. The least value of 1.53 g was recorded from seedlings cultivated in unamended soil (control) [Table 5].

Nutrient Composition of Leaf Litters of Selected Nitrogen Fixing *Albizia* Trees

Highest nitrogen (7.05%), phosphorus (0.213%), and potassium (0.573%) were written from leaf litters of *A. ferruginea*, *A. coriaria*, and *A. lebbeck*, respectively. The least values of nitrogen (0.05%), phosphorus (0.02%), and potassium (0.07%) were recorded from control treatment [Table 6].

DISCUSSION

The highest growth variables recorded from seedlings cultivated in the soil improved with leaf litters of *A. coriaria* were adduced to ability to release its rich nutrients. Similar observation has been recorded by[62] who documented highest growth parameters from *Vitellaria paradoxa* seedlings cultivated in the soil enhanced with *Acacia leucophloea* and connected the accomplishment of *A. leucophloea* to the release of its rich nutrient for plant growth.

The outstanding growth performance written from seedlings cultivated in the soil embellished accompanying *A. coriaria* could be traced to release of its highest phosphorus content

Table 4: Influence of leaf litters of selected nitrogen fixing *Albizia* trees on the leaf area (cm^2) of *Chrysophyllum albidum* seedlings

NFAT	WAT					
	4	8	12	16	20	24
Albizia lebbeck	11.42^{b}	19.75^{b}	20.14^{ab}	21.73^{b}	25.61^{b}	49.95^{c}
Albizia zygia	19.89^{a}	22.36^{ab}	23.72^{ab}	38.97^{a}	46.70^{ab}	80.49^{ab}
Albizia coriaria	17.72^{ab}	20.31^{ab}	21.64^{ab}	27.56^{ab}	48.30^{ab}	85.45^{a}
Albizia ferruginea	12.26^{b}	19.38^{b}	23.72^{ab}	38.08^{a}	54.47^{a}	65.98^{b}
Albizia saman	12.43^{b}	27.32^{a}	29.54^{a}	31.04^{ab}	35.05^{b}	38.21^{cd}
Control	10.09^{b}	10.14^{c}	19.06^{b}	21.91^{b}	24.75^{b}	30.07^{d}
SE±	2.35	3.03	4.11	4.73	5.62	6.54

*Means on the same column having different superscripts are significantly different (P<0.05). NFAT: Nitrogen fixing *Albizia* trees, WAT: Weeks after transplanting

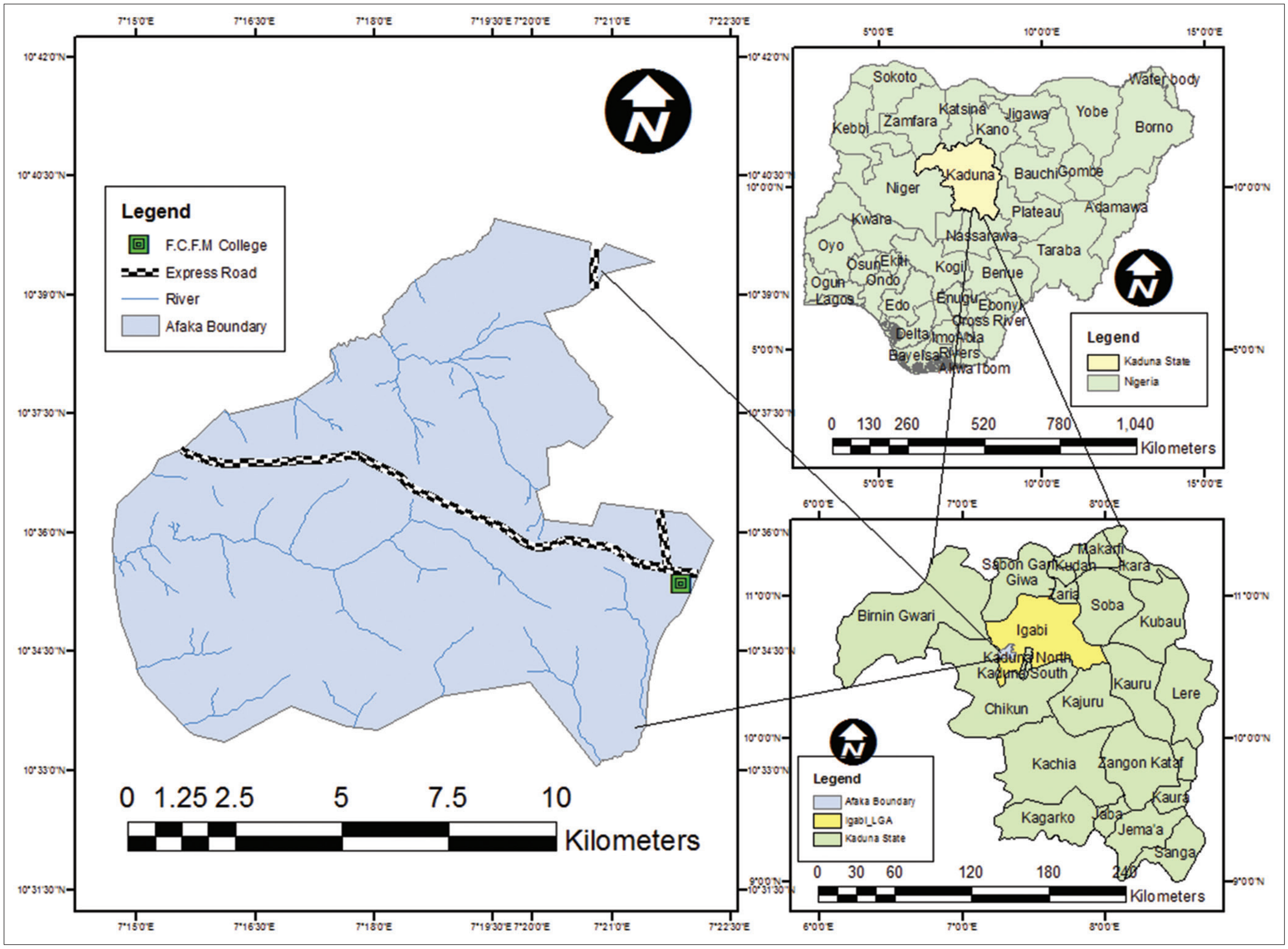

Figure 1: The location of federal college of forestry mechanization, Afaka, Kaduna state, Nigeria

Table 5: Influence of leaf litters of selected nitrogen fixing *Albizia* trees on the fresh and dry weight (g) of *Chrysophyllum albidum* seedlings

NFAT	FW			TFW	DW			TDW
	L	R	S		L	R	S	
Albizia lebbeck	10.60[a]	2.90[a]	2.40[ab]	15.90[ab]	2.75[b]	1.30[ab]	1.20[a]	5.25[ab]
Albizia zygia	14.00[a]	2.70[a]	2.15[ab]	18.85[a]	5.45[ab]	1.20[ab]	1.05[a]	7.70[a]
Albizia coriaria	15.09[a]	3.55[a]	2.95[a]	21.59[a]	6.10[a]	1.50[a]	1.40[a]	9.00[a]
Albizia ferruginea	14.55[a]	2.25[a]	2.05[ab]	18.85[a]	5.85[a]	0.80[ab]	1.00[a]	7.65[a]
Albizia saman	12.00[a]	1.60[b]	1.00[b]	14.60[ab]	3.45[ab]	0.50[b]	0.70[a]	4.65[ab]
Control	4.00[b]	1.21[b]	0.98[b]	6.19[b]	0.55[b]	0.30[b]	0.68[a]	1.53[b]
SE±	2.68	0.70	0.66	4.04	1.14	0.36	0.34	1.84

Means on the same column having different superscripts are significantly different ($P<0.05$). NFAT: Nitrogen fixing *Albizia t*rees, FW: Fresh weight, TFW: Total fresh weight, DW: Dry weight, TDW: Total dry weight, Rs: Rates, L: Leaf, S: Shoot, R: Root

relative to other investigated species. Phosphorus improves seedling growth. This is in accordance with the report of[70] who established that the maximum rate of P (750 kg/ha) shown the highest *Leucaena leucocephala* height and stem diameter compared to the other rates during the 2 year period. The observations revealed that the *Acacia auriculiformis* seedling growth was embellished considerably accompanying the application of P fertilizer[71,72] decided that (100 kg/ha) dose of phosphorus was the best for getting maximum yield of *Tagetes erecta* at Tulsipur, Dang condition. The application

Table 6: Nutrient composition of leaf litters of selected nitrogen fixing *Albizia* trees

NFAT	*n*%	*P*%	K%
Albizia ferruginea	7.05	0.200	0.510
Albizia zygia	6.85	0.161	0.473
Albizia coriaria	5.24	0.213	0.524
Albizia lebbeck	5.89	0.184	0.573
Albizia saman	6.60	0.170	0.451
Control	0.05	0.02	0.07

of 464 kg/ha ammonium sulfate, and 300 kg/ha triple superphosphate improve initial height, diameter growth, and total plant weight of *Tectona grandis* seedlings[73-75] established that the increase in soil P level influence taller above ground biomass of *Alnus nepalensis*.

Phosphorus (P) is part of the nuclei acid structure of plants which is responsible for the regulation of protein synthesis[76] mentioned that phosphorus plays a main part in the growth of new tissue and division of cells. One of the benefits of phosphorus in plants is proper development of the roots and hastening of maturity. Tajer[76] reported that phosphorus is an important component of DNA which contains the genetic data of all living things. It is also a critical part of the RNA which reads the genetic code answerable for the building of protein and other compounds compulsory to form the structure of the hydroponics plants.[76] Phosphorus is also part of energy molecules such as the ATP and NADPH, which help in the development of carbon skeletons and, consequently, in plant growth.[77] Phosphorus is paramount for the ATP component. ATP is formed during photosynthesis and contains phosphorus as part of its structure. Tajer[76] mentioned that phosphorus is necessary for photosynthesis and also in the depository and movement of the nutrients all over the plant.

The substantial increase in plant growth and development is linked to the fact that phosphate fertilization advances the plant development, on account of its participation in distinct reactions in the plants photosynthetic metabolism, acting on their breathing, storage, energy transference, and cellular growth. Tajer[76] and Dias *et al*.[78] further reported that phosphorus assists plant to have resistance to diseases by developing their parts to grow quickly. Phosphorus restricts the plant growth. Lawrence[79] established that in addition to earlier studies, evidence for positive growth response and luxury consumption among light demanding species suggests that P, rather than N, should restrict seedling performance and may ultimately influence tree diversity in young secondary tropical forests.

Anyway, extremely high phosphorus level would restrict the photosynthesis, and even the growth of *A. nepalensis* seedlings.[80] On the other hand, the increased addition of phosphate fertilizer on *Manilkara zapota*[81] and *Passiflora edulis*[82] considerably raised their dry matter, shoot and total length.

The least growth limits written from seedlings cultivated in the soil without the amendments of leaf litters of nitrogen fixing Albizias could be tracked to its failure to supply seedlings adequate nutrients for growth compared to that of soil influenced with leaf litters of nitrogen fixing *Albizia*s.

CONCLUSION

The current trend in agroforestry system is to search out for propagation of priority, economic indigenous trees species as *C. albidum* to meet the population demand of its potentials and encourage its biodiversity conservation in Africa as well as in the World. The use of inexpensive, approachable, and environmentally companionable plant located natural fertilizer to improve the growth of *C. albidum* is vital. Investigation carried out on the influence of leaf litters of nitrogen fixing Albizias on the growth of *C. albidum* disclosed that planting of *C. albidum* in the soil modified with leaf litters of *A. coriaria* embellishes its growth.

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